ATTACHMENT B

Cleaned-Up Version of Amended Claims (as of 1/23/2003)

1. A method of forming a silicon-carbide item, the method comprising:

(a) forming a preform from wood, then

(b) heating the preform under pressure to a first temperature in an autoclave, then

(c) heating the preform to a second temperature in a furnace at atmospheric pressure to pyrolyze the preform, the second temperature being higher than the first temperature; and then

(d) infusing the preform with a liquid containing silicon for forming a silicon-carbide item that retains the shape of the preform.

2. The method of claim 1, wherein:

in step (d), the liquid is an alloy, and wherein the liquid infiltrates pores of the preform.

3. The method of claim 1, wherein:

in step (d), after infusion, the preform is held for a selected time at a temperature between approximately 900°C and approximately 1450°.

4. The method of claim 1, further comprising:

after step (c) and before step (d), machining the preform to net-shape dimensions to thereby account for changes in the perform caused by pyrolization.

5. The method of claim 1, wherein:

step (a) comprises forming the preform from a solid block of wood, wherein a vacuum is applied to substantially surround the perform prior to the step of heating the perform under pressure in the autoclave, and wherein the pressure in the autoclave minimizes temperature gradients in the autoclave and in the perform to thereby maintain dimensional stability in the preform.

6. The method of claim 1, wherein:

step (a) comprises forming the preform from wood particles and binders, wherein a vacuum is applied to substantially surround the perform prior to the step of heating the perform under pressure in the autoclave, and wherein the pressure in the autoclave minimizes temperature gradients in the autoclave and in the perform to thereby maintain dimensional stability of the preform.

7. The method of claim 1, wherein:
the first temperature is between 375°C and 400°C.

8. The method of claim 1, wherein:
the second temperature is between 900°C and 1100°C.

9. The method of claim 1, wherein:
the first temperature is approximately 400°C; and
the second temperature is approximately 1000°C.

10. The method of claim 1, wherein:
step (b) comprises increasing the temperature of the autoclave from a starting temperature to the first temperature at a maximum rate of 5°C per minute, and wherein the temperature is increased to a level to cause bio-oil to emerge from the preform.

11. The method of claim 1, wherein:
step (c) comprises increasing the temperature of the furnace from a starting temperature to the second temperature at a maximum rate of 5°C per minute, wherein the furnace includes an inert gas being used therein to prevent combustion, and the method further comprising cooling the perform under constantly flow of the inert gas prior to step (d).

12. The method of claim 1, wherein:
step (b) comprises increasing the temperature of the autoclave from a starting temperature to the first temperature at a maximum rate of 5°C per minute; and

step (c) comprises increasing the temperature of the furnace from a starting temperature to the second temperature at a maximum rate of 5°C per minute.

13. The method of claim 1, further comprising machining a recess into an upper surface of the perform after the perform is formed and prior to the step of heating the perform under pressure, and wherein step (b) comprises:

covering the preform with a vacuum bag and evacuating air from the bag; then

heating the preform and vacuum bag to a drying temperature lower than the first temperature; then

removing the vacuum bag and heating the preform to the first temperature.

14. A method of forming a silicon-carbide items, the method comprising:

(a) forming a preform from wood, then

(b) covering the preform with a vacuum bag and evacuating air from the bag; then

(c) heating the preform and vacuum bag under pressure to a drying temperature in an autoclave; then

(d) removing the vacuum bag and heating the preform under pressure to a first temperature in the autoclave, the first temperature being higher than the drying temperature; then

(e) heating the preform to a second temperature in a furnace at atmospheric pressure to pyrolyze the preform, the second temperature being higher than the first temperature; and then

(f) infusing the preform with a liquid containing silicon for forming a silicon-carbide item that retains the shape of the preform.

15. The method of claim 14, wherein:

in step (f), the liquid is an alloy.

16. The method of claim 14, wherein:

in step (f), after infusion, the preform is held for a selected time at a temperature between approximately 900°C and approximately 1450°.

17. The method of claim 14, further comprising:
after step (e) and before step (f), machining the preform to net-shape dimensions.

18. The method of claim 14, wherein:
step (a) comprises forming the preform from a solid block of wood.

19. The method of claim 14, wherein:
step (a) comprises forming the preform from wood particles and binders.

20. The method of claim 14, wherein:
the first temperature is between 375°C and 400°C.

21. The method of claim 14, wherein:
the second temperature is between 900°C and 1100°C.

22. The method of claim 14, wherein:
the first temperature is approximately 400°C; and
the second temperature is approximately 1000°C.

23. The method of claim 14, wherein:
step (d) comprises increasing the temperature of the autoclave from a starting temperature to the first temperature at a maximum rate of 5°C per minute.

24. The method of claim 14, wherein:
step (e) comprises increasing the temperature of the furnace from a starting temperature to the second temperature at a maximum rate of 5°C per minute.

25. The method of claim 14, wherein:
step (d) comprises increasing the temperature of the autoclave from a starting temperature to the first temperature at a maximum rate of 5°C per minute; and

step (e) comprises increasing the temperature of the furnace from a starting temperature to the second temperature at a maximum rate of 5°C per minute.

26. A method of forming a composite component, the method comprising:

(a) forming a preform from wood, the preform being shaped as a mold; then

(b) pyrolyzing the preform; then

(c) infusing the preform with liquid containing silicon; then

(d) holding the infused preform at a selected temperature to form a silicon-carbide tool that retains the shape of the preform, the tool having at least one tooling surface for receiving layers of composite material; then

(e) applying the layers of composite material to the tooling surface to form the component; then

(f) curing the component on the tooling surface; and then

(g) removing the cured component from the tool.

27. The method of claim 26, wherein:

in step (c), the liquid is an alloy.

28. The method of claim 26, wherein:

in step (d), the selected temperature is between approximately 900°C and approximately 1450°.

29. The method of claim 26, wherein step (b) comprises:

heating the preform under pressure to a first temperature in an autoclave, then

heating the preform to a second temperature in a furnace, the second temperature being higher than the first temperature.

30. The method of claim 26, wherein:

step (a) comprises forming the preform from a solid block of wood.

31. The method of claim 26, wherein:

step (a) comprises forming the preform from wood particles and binders.

32. The method of claim 26, further comprising:

after step (d) and before step (e), applying a mold release to the tooling surface.

33. The method of claim 26, wherein:

step (a) comprises forming the tool as a negative mold, the dimensions of the mold being undersized.

34. The method of claim 26, wherein:

step (a) comprises forming the tool as a positive mold, the dimensions of the mold being oversized.

35. A method of forming a silicon-carbide item, the method comprising:

(a) forming a preform from wood, then

(b) heating the preform under pressure to a first temperature in an autoclave, the step of heating the perform under pressure including the steps of covering the preform with a vacuum bag, evacuating air from the bag, then heating the preform and vacuum bag to a drying temperature lower than the first temperature, then removing the vacuum bag and heating the preform to the first temperature, then

(c) heating the preform to a second temperature in a furnace at atmospheric pressure to pyrolyze the preform, the second temperature being higher than the first temperature; and then

(d) infusing the preform with a liquid containing silicon for forming a silicon-carbide item that retains the shape of the preform.